

REMARKS

In view of the above amendments and following remarks, reconsideration and further examination are requested.

A replacement formal drawing has been provided for Figure 19 so as to designate this figure as --Prior Art--, as suggested by the Examiner.

The specification and abstract have been reviewed and revised to make editorial changes thereto and generally improve the form thereof, and a substitute specification and abstract are provided. No new matter has been added by the substitute specification and abstract.

Claims 1, 2 and 4-33 have been amended.

The instant invention pertains to a substrate processing apparatus which is useful for removing metal, organic materials and the like adhering to a surface of a substrate. Such a substrate processing apparatus is generally known in the art, but suffers from drawbacks as expressed on pages 1-5 of the specification. Applicants have addressed and resolved these drawbacks by providing a unique substrate processing apparatus.

In accordance with a first aspect of the invention, as shown in Figures 1-4 for example, the substrate processing apparatus comprises: a substrate holder 3 for holding a substrate W, anodes 21 and cathodes 22 disposed so as to face a surface of the substrate when held by the substrate holder and arranged alternately along at least one direction; a processing liquid supply section 27 for supplying a processing liquid between the substrate, when held by the substrate holder, and the anodes and cathodes; and a power source 32 for applying a voltage between the anodes and the cathodes. Independent claims 1 and 10 are representative of this aspect of the invention.

In accordance with a second aspect of the invention, as shown in Figure 13 for example, the substrate processing apparatus comprises: a processing liquid supply section 74 for supplying a processing liquid onto a substrate W; a micro-bubble generator 76 for generating micro-bubbles in the processing liquid; and an ultrasonic transducer 64 for emitting ultrasonic waves to the processing liquid containing the micro-bubbles. Independent claim 20 is representative of this aspect of the invention.

And, in accordance with a third aspect of the invention, as shown in Figure 14 for example, the substrate processing apparatus comprises: a substrate holder 210 for holding and rotating a substrate W; a rotary plate 230 disposed opposite to one of front and back surfaces of the substrate when held by the substrate holder, with the rotary plate being arranged at a predetermined distance from the substrate so as to form a circular processing space therebetween; and a first fluid supply section 235 for supplying a first processing fluid to fill the circular processing space with the first processing fluid. Independent claim 26 is representative of this aspect of the invention.

Claims 1-9 and 16-33 were provisionally rejected on the ground of non statutory obviousness-type double patenting as being unpatentable over claims 1-54 of copending application number 10/364,404. In order to obviate this rejection a properly executed terminal disclaimer is provided herewith.

Claims 1-3, 5, 6, 8 and 26-28 were rejected under 35 U.S.C. § 102(e) as being anticipated by Emesh et al; claims 16-19 were rejected under 35 U.S.C. § 102(e) as being anticipated by Lee et al.; claims 20-25 were rejected under 35 U.S.C. § 102(e) as being anticipated by Miyazaki et al.; claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Emesh et al. in view of Switzer; claim 7 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Emesh et al. as evidenced by Tatsura et al.; claim 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Emesh et al. in view of Shinozuka et al.; and claims 29-33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Emesh et al. in view of Taniguchi et al. These rejections are respectfully traversed and the references relied upon by the Examiner are not applicable with regard to the currently amended claims for the following reasons.

Claim 1 has been amended so as to clarify an arrangement of the anodes and cathodes. Specifically, amended claim 1 requires that the anodes and cathodes are disposed so as to face a surface of a substrate when held by the substrate holder, so that a processing liquid can be supplied between the substrate and the anodes and cathodes. In such a state, a voltage is applied between the anodes and the cathodes to cause a bipolar phenomenon in presence of the processing liquid, whereby the substrate is uniformly processed.

To the contrary, Emesh et al. teaches an apparatus for depositing a material onto a substrate, and polishing the material. In this apparatus, during a polishing process an electric potential is applied to create a circuit between a platen 206 and a surface of wafer 212, both of which act as electrodes. Please see paragraph [0046]. Thus, contrary to *anodes and electrodes disposed so to face a substrate* when held by a substrate holder, as required by claim 1, because the substrate itself is a cathode, this cathode cannot face the substrate. Accordingly, the arrangement of electrodes of Emesh et al., is completely different from that as required by claim 1, whereby claim 1 is not anticipated by Emesh et al., such that claim 1 and its dependent claims are allowable.

Claim 20 recites an apparatus comprising a micro-bubble generator and an ultrasonic transducer for emitting ultrasonic waves to a processing liquid containing micro-bubbles. In rejecting claim 20 as being anticipated by Miyazaki et al., the Examiner took the position that this reference teaches a micro-bubble generator and an ultrasonic transducer 50. However, this ultrasonic transducer is provided as a fractionizing means for fractionizing particulate aggregates in a slurry (see column 6, lines 28-39). Miyazaki et al. does not teach or suggest that the ultrasonic transducer is provided for the purpose of emitting ultrasonic waves to a processing liquid containing micro-bubbles so as to collapse the micro-bubbles. Indeed, the embodiment of Miyazaki et al. that includes the micro-bubble generator (Fig. 13) does not include an ultrasonic transducer. Thus, claim 20 is not anticipated by Miyazaki et al., whereby claim 20 and its dependent claims are allowable.

Claim 26 recites that a rotary plate is to be disposed a certain distance from the substrate so as to form a *circular* processing space therebetween. This circular processing space can prevent processing liquid retained therein from contacting air. Additionally, the processing liquid filling the circular processing space can cover an entire surface of the substrate, and therefore, uniform processing can be realized.

To the contrary, Emesh et al. does not teach or suggest a rotary plate that is to be spaced from a substrate so as to form a circular processing space. In this regard, the Examiner has equated platen 206 in Emesh et al. to the claimed rotary plate. However, although the platen 206

is spaced from wafer 212, polishing pad 204 is mounted on an upper surface of the platen 206, and the wafer 212 engages the polishing pad 204 at a desired pressure during processing (see paragraph 0059 and FIG. 8). With this arrangement, grid-like grooves 304 as shown in Figure 5 define a processing space, and accordingly, a circular processing space is not formed between the wafer 212 and the platen 206. Thus, claim 26 is not anticipated by Emesh et al., whereby claim 26 and its dependent claims are allowable over Emesh et al.

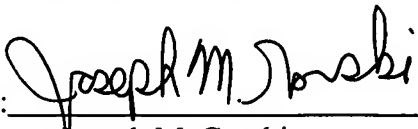
The other references do not resolve the above deficiencies, and accordingly, it is respectfully submitted that claims 1-33 are allowable over the relied-upon references either taken alone or in combination. With regard to claim 10, please note that in accordance with MPEP 821.04, because this claim includes all the limitations of claim 1, it is respectfully submitted that claim 10 should be rejoined with claim 1 upon claim 1 being allowed.

In view of the above amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and an early Notice of Allowance is earnestly solicited.

If after reviewing this Amendment, the Examiner believes that any issues remain which must be resolved before the application can be passed to issue, the Examiner is invited to contact the Applicant's undersigned representative by telephone to resolve such issues.

Respectfully submitted,

Akihisa HONGO et al.

By: 

Joseph M. Gorski
Registration No. 46,500
Attorney for Applicants

JMG/tnt
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
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